

## **DERIVATION OF EIGENVECTORS FOR SPATIAL PROCESSING IN MIMO COMMUNICATION SYSTEMS**

### **ABSTRACT**

Techniques for deriving eigenvectors based on steered reference and used for spatial processing. A steered reference is a pilot transmission on one eigenmode of a MIMO channel per symbol period using a steering vector for that eigenmode. The steered reference is used to estimate both a matrix  $\underline{\Sigma}$  of singular values and a matrix  $\underline{U}$  of left eigenvectors of a channel response matrix  $\underline{H}$ . A matrix  $\tilde{\underline{U}}$  with orthogonalized columns may be derived based on the estimates of  $\underline{\Sigma}$  and  $\underline{U}$ , e.g., using QR factorization, minimum square error computation, or polar decomposition. The estimates of  $\underline{\Sigma}$  and  $\underline{U}$  (or the estimate of  $\underline{\Sigma}$  and the matrix  $\tilde{\underline{U}}$ ) may be used for matched filtering of data transmission received via a first link. The estimate of  $\underline{U}$  or the matrix  $\tilde{\underline{U}}$  may also be used for spatial processing of data transmission on a second link (for reciprocal first and second links).